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# Nutrition and pH of Trigona Honey from Masamba, South Sulawesi, Indonesia

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**Abstract**

Honey bee Trigona is a bee product that has a high availability but still lack the exploration of the evidence. This study aims to explore the nutrient content and pH Trigona honey from Masamba, Indonesia. Trigona honey from Masamba has a low pH with total phenol content and high quercetin, vitamin C is the highest compared vitamin A and E and Calcium is the highest content of minerals than magnesium and Zinc. While the content value of carbohydrate nutrient was greater than content of the protein. This study is expected to become the basis for further studies in vitro and in vivo on the benefits of Trigona honey from Masamba Indonesia.

***Keywords:*** pH; Trigona Honey.

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## 1. Introduction

Honey is a bee product whose main components are fructose and glucose and contained protein, amino acids, vitamins, enzymes, minerals and other minor components [1]. Honey is rich in phenolic content such as quercetin, caffeic acid phenethyl ester (CAPE), acacetin, kaempferol, galangin that act as antioxidants natural [2]. Antioxidants are beneficial to many types of diseases associated with components of polyphenols, peptides, enzymes and organic acids. Bee products are also used in gastrointestinal diseases, cardiovascular, inflammatory and neoplastic conditions [3].

Bees suck various kinds of plants so that the composition of honey depends on several factors such as geographical area, the season, the storage method, the type of bees and also the interaction between the chemical components and enzymes in honey. In general, honey aroma formed from volatile compounds derived from nectar or honeydew collected by bees so the aroma depends on the type of its growth and maturity honey. Typically, honey was coming from one species of flora has its own strong aroma compared with the poliflora. Besides aroma, phenol components, carbohydrates and amino acids can also distinguish the type of flora honey [4].

Honey, based on the evidence that there could be used as an antibacterial such as Salmonella bacteria and this is making honey could serve as therapeutic [5]. Flavonoids contained in honey can also serve as an antibacterial through functions that can inhibit the cytoplasmic membrane and energy metabolism in bacteria. Besides that the flavonoids are also said to be capable of blocking the interaction between bacteria and LPS receptor TLR4 / MD2 and CD14 [6]. Propolis flavonoid, quercetin also able to increase the permeability of bacterial inhibition [7].

Knowledge about the nutrient content of honey is important for the use of honey in the world of health, so this study aimed to analyze the content of honey Trigona from Masamba district, Province of South Sulawesi.

## 2. Material and Methods

Honey was taken from Masamba, Luwu Utara South Sulawesi province of Indonesia. Honey was then deposited in a dark room for 72 hours so that dirt can settle and found honey in a clean condition then put the heating / drying oven to reduce the moisture content in honey.

Testing PH, quercetin and polyphenols honey was done in the laboratory Biofarmaka of Hasanuddin University Research Centre by using High Performance Liquid Cromatoghraphy (HPLC) and spectrophotometry. Total phenolic tested by the Folin-Ciocalteu method and content of flavonoids (quercetin) and flavonoids (quercetin) were determined by the method of aluminum chloride based procedures ever undertaken by Chang et al (2002). Examination of vitamin A, vitamin C and vitamin E using spectrophotometric methods, examination of calcium (Ca), magnesium (Mg) and zinc (Zn) using atomization method. Examination of the moisture content using the gravimetric method and carbohydrates using titrimetric method. All these parameters are checked at the Center for Health Laboratory (BBLK) with protocols based on ISO standards.

## 3. Result

**Table 1:** The content of phenol, Quercetin, Vitamin and Mineral of Trigona Honey from Masamba Regency, South Sulawesi, Indonesia

| Parameter | Total of content |
|---|---|
| Total Phenol | 106.0 mg/100 g |
| Quercetin | 58.8 % |
| Vitamin A | 0.50 ug/g |
| Vitamin C | 302.85 ug/g |
| Vitamin E | 9.95 ug/g |
| Calcium (Ca) | 217.2 ppm |
| Magnesium (Mg) | 162.05 ppm |
| Zinc(Zn) | 0.27 ppm |
| Carbohydrate | 49.68 % |
| Protein | 0.03 % |
| Ph | 3.34 |

Results of the nutritional content of Trigona honey study showed that the highest mineral content of trigona honey was vitamin C (302.85 ug / g) and the lowest was Zn (0.27 ppm) and the other component consists of a total of 106.0 mg Phenol / 100, the levels of quercetin honey Trigona was 58 , 8 mg / 100 g. While vitamin A content (0.50 ug / g) of vitamin E (9.95 ug / g), Ca (217.2 ppm), Mg (162.05 ppm). While the nutritional content of honey higher Trigona Carbohydrates (49.68%) compared to protein (of 0.03%). And Ph value of honey Trigona was 3:34.

## 4. Discussion

Trigona honey from Masamba, Province of South Sulawesi shown to contain quercetin, nature Quercetin has immunostimulan function through its ability to induce Th1 cytokine IFN-γ secreting (Nair et al., 2002). Several studies were able to prove that honey can increase levels of IL-6, TNF-α and IFN-γ [8]. Honey can also act as anti-inflammatory [9]. The protein content of honey can stimulate the immune system to physiological responses in target cells through specific receptors. For example glycosides inject proteins TNF-α secretion of macrophages and 55 kDa glycoprotein major royal jelly protein 1 (MRJP1), it is responsible for immunomodulatory effects. Immune stimulation of other body protein is a type II arabinogalactan protein capable of inducing monocytic cells to release TNF-α [10,11]

Polyphenols, vitamins A and C can affect DNA demethylation that also affects the immune homeostasis [12]. The pH value of the honey that reaches between 3.2 and 4.5, with this acidity inhibits the growth of microorganisms, such as E. coli, Pseudomonas aeruginosa (P. aeruginosa), Salmonella species, and Streptococcus pyogenes [3, 13]. The nutritional content of Trigona honey could be the basis for in vivo and in vitro studies on the benefits to the health of the world even though there are many nutrients that are unexplored.

## 5. Conclusion

Trigona honey contains a low pH with a total content of phenols and quercetin are high while the vitamin content is checked, the content of vitamin C is the highest compared vitamin A and E and for minerals, Calcium is the most high content compared of magnesium and Zinc. While the content value of carbohydrate nutrient was greater than content of the protein.

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